

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

**(19) World Intellectual Property Organization  
International Bureau**



A standard linear barcode is located at the bottom of the page, spanning most of the width. It is used for document tracking and identification.

**(43) International Publication Date  
20 October 2005 (20.10.2005)**

PCT

(10) International Publication Number  
**WO 2005/099276 A3**

**(51) International Patent Classification:**  
*H04N 7/36* (2006.01)      *H04N 7/26* (2006.01)  
*H04N 7/46* (2006.01)

(81) **Designated States (unless otherwise indicated, for every kind of national protection available):** AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(21) International Application Number: PCT/US2005/011359

(22) International Filing Date: 31 March 2005 (31.03.2005)

(25) Filing Language: English

(26) Publication Language: English

**(30) Priority Data:** 60/558,862 2 April 2004 (02.04.2004) US

(71) **Applicant (for all designated States except US): THOMSON RESEARCH FUNDING CORPORATION**

[US/US]; 10330 North Meridian Street, INH 340, Indianapolis, Indiana 46290 (US).

(72) **Inventors;** and  
(75) **Inventors/Applicants (for US only): BOYCE, Jill, MacDonald [US/US]; 3 Brandywine Court, Manalapan, New Jersey 07726 (US). TOURAPIS, Alexandros, Michael [GR/US]; 1550 Vista Club Circle #304, Santa Clara, California 95051 (US).**

(74) **Agents:** **TRIPOLI, Joseph, S. et al.**; Thomson Licensing Inc., Two Independence Way, Suite #200, Princeton, New Jersey 08540 (US).

(84) **Designated States** (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

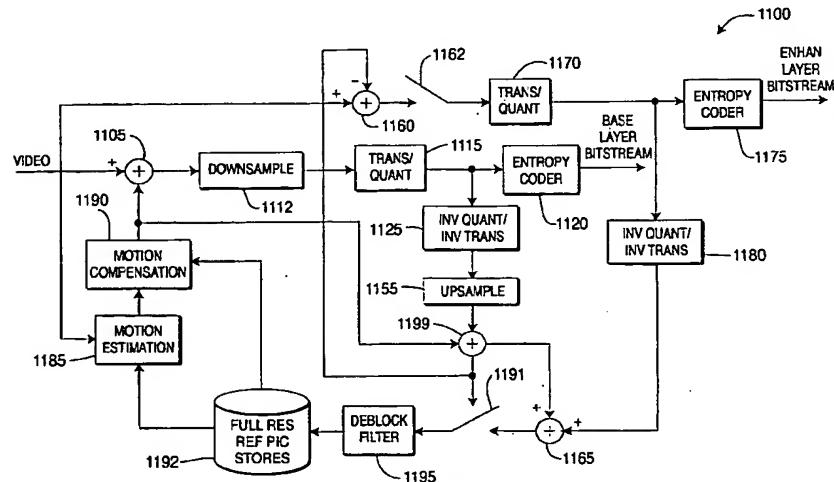
**Published:**

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

**(88) Date of publication of the international search report:**  
27 April 2006

[Continued on next page]

**(54) Title: COMPLEXITY SCALABLE VIDEO ENCODING**



**(57) Abstract:** A video decoder, a video decoding method, a video encoder and a video encoding method are disclosed. A video decoder for decoding a video bitstream for an image block includes a motion vector resolution reducer (999) and a motion compensator (960). The motion vector resolution reducer is for receiving decoded high resolution motion vectors included in the video bitstream and for reducing an accuracy of the high resolution motion vectors to correspond to a low resolution. The motion compensator, in signal communication with the motion vector resolution reducer, is for forming a motion compensated high resolution prediction using the reduced accuracy motion vectors. The video encoder for encoding scalable video comprises a motion compensator (1190) for forming a motion compensated full resolution prediction and combining (1105) the motion compensated full resolution prediction from an image block to form a prediction residual. The prediction residual is downsampled (1112) to form a low resolution downsampled prediction residual and then coded (1115).

WO 2005/099276 A3

WO 2005/099276 A3



*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

# INTERNATIONAL SEARCH REPORT

ational Application No  
/US2005/011359

A. CLASSIFICATION OF SUBJECT MATTER  
H04N7/36 H04N7/46 H04N7/26

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	"Recommendation H.263: Video coding for low bit rate communication" ITU-T DRAFT RECOMMENDATION H.263, February 1998 (1998-02), pages 1-167, XP002176560 page 129, paragraph Q.1 - page 142, paragraph Q.7.2 figure Q.1/H.263	1-6,8-13
A	----- -/-	7,14

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

\* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*&\* document member of the same patent family

Date of the actual completion of the international search

23 January 2006

Date of mailing of the international search report

17/02/2006

Name and mailing address of the ISA  
European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Sampels, M

## INTERNATIONAL SEARCH REPORT

ational Application No  
/US2005/011359

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>GHANBARI M.: "STANDARD CODECS: IMAGE COMPRESSION TO ADVANCED VIDEO CODING. Chapter 8: Coding of high quality moving pictures (MPEG-2)"  2003, THE IEE ( THE INSTITUTION OF ELECTRICAL ENGINEERS ), LONDON, UK ,  XP002364049  ISBN: 0-85296-710-1  pages 181-226  page 200, line 6 - page 205, line 11;  figure 8.11</p> <p>-----</p>	1-6, 8-13,15
A	<p>SHIN J H ET AL: "REGULARIZED ITERATIVE IMAGE INTERPOLATION AND ITS APPLICATION TO SPATIALLY SCALABLE CODING"  IEEE TRANSACTIONS ON CONSUMER ELECTRONICS,  IEEE INC. NEW YORK, US,  vol. 44, no. 3, August 1998 (1998-08),  pages 1042-1047, XP000851618  ISSN: 0098-3063  page 1044, right-hand column, line 15 -  page 1045, left-hand column, line 2  figure 4</p> <p>-----</p>	1-15
A	<p>WELLS N D ET AL: "Standardisation of scalable coding schemes HDTV"  IEE COLLOQUIUM ON DIGITAL TERRESTRIAL TELEVISION, 10 November 1993 (1993-11-10),  pages 6-1, XP006520125  IEE, London, UK  the whole document</p> <p>-----</p>	1-15
E	<p>WO 2005/093661 A (THOMSON RESEARCH FUNDING CORPORATION; TOURAPIS, ALEXANDROS; BOYCE, JIL) 6 October 2005 (2005-10-06)  page 11, line 9 - page 12, line 15  figure 6  claims 1,11,23</p> <p>-----</p>	1,2,8,9, 15

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

National Application No

P/US2005/011359

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2005093661	A 06-10-2005	NONE	